



Serial No. 10/089,805

**AMENDMENTS TO THE DRAWINGS:**

The attached drawing(s) include changes to FIGS. 1-4. The sheets containing FIGS. 1-4 replaces the original sheets including FIGS. 1-4.

In FIG. 1, block 10 is labeled "quadrant correction", blocks 11, 12, and 13 are labeled "micro rotation", respectively, block 14 is labeled "sign table", block 19 is labeled "delay table", and block 31 is labeled "register".

In FIG. 2, block 15 is labeled "ROM".

In FIG. 3, blocks 20 and 21 are labeled "shift register", respectively, and blocks 22 and 23 are labeled "accumulator", respectively.

In FIG. 4, block 24 is labeled "pre-filter", block 25 is labeled "decimator", block 26 is labeled "offset compensation", block 27 is labeled "CORDIC frequency correction", block 28 is labeled "postfilter", block 29 is labeled "decimator", and block 30 is labeled "digital signal processor".

Approval of these changes to the drawings is respectfully requested.

## **REMARKS**

In accordance with the foregoing, claims 1, 2, 5, 7, 27, and 28 have been amended. Claims 1-28 are pending and under consideration.

### **ALLOWABLE SUBJECT MATTER**

Applicants acknowledge with appreciation the indication of allowable subject matter regarding claims 11-17 and 24-27. However, since Applicants consider that claim 7, from which claims 11-17 and 24-27 depend, defines patentable subject matter, claims 11-17 and 24-27 are maintained in dependent form at the present time.

### **OBJECTIONS TO THE DRAWINGS**

In the Office Action at item 1, the drawings are objected to due to lack of labels. In order to overcome these objections, replacement figures, which include the appropriate labels, are submitted herewith. Approval of these changes to the drawings is respectfully requested.

### **CLAIM OBJECTIONS**

In response to the objections to the claims, Applicants amended the claim language to correct the noted informalities. In light of the amended language, Applicants respectfully request withdrawal of the objections.

### **CLAIM REJECTIONS UNDER 35 U.S.C. §112**

In paragraph 9 of the outstanding Office Action, claim 1 was rejected under 35 U.S.C. §112 for lack of clarity in the claim language. The noted lack of clarity is corrected herewith as suggested in the Office Action. In view of the amended language of claim 1, Applicants respectfully request withdrawal of the rejection and consideration on the merits of claim 1 and claims 2-6, 18-21 and 23, which depend from claim 1.

### **CLAIM REJECTIONS UNDER 35 U.S.C. §103**

In paragraph 12 on page 4 of the outstanding Office Action, claims 7 and 8 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,192,089 to Corleto et al. (hereinafter "Corleto") in view of U.S. Patent No. 5,784,414 to Bruekers et al. ("Bruekers"). In paragraph 14 on page 6 of the outstanding Office Action, claim 8 is also rejected under 35 U.S.C. §103(a) as being unpatentable over Corleto and Bruekers as applied to claim 7 and further in view of U.S. Patent No. 5,052,050 to Collier et al. ("Collier"). In paragraph 16 on page 7

of the outstanding Office Action, claims 9 and 22 are rejected under 35 U.S.C. §103(a) as being unpatentable over Corleto and Bruekers as applied to claims 7 and 8 and further in view of the article "The Cordic Trigonometric Computing Technique" by Jack E Volder published in IRE Transactions on Electronic Computer, Vol. EC-8, pages 330-334, September 1959 ("Volder"). In paragraph 18 on page 8 of the outstanding Office Action, claim 10 is rejected under 35 U.S.C. §103(a) as being unpatentable over Corleto, Bruekers and Volder as applied to claims 7, 8 and 9 and further in view of U.S. Patent No. 4,603,300 to Welles, II, et al. ("Welles").

Corleto discloses an automatic frequency control circuit and a method for automatic frequency control in a digital receiver using the CORDIC computing technique.

Claim 7 is directed to a digital frequency correction apparatus for a signal, which is sampled with a sample cycle (k) and is digitized (x(k)). The apparatus of claims 7 includes "N micro-rotation blocks receiving a signal ( $i_0, q_0$ )", "a sign table providing to each micro-rotation block a sign ( $\sigma_n$ ) from a sign table", "a register driving the sign table and supplying a register value (w(k)), a delay element", and "an adder adding a predetermined frequency value to an output value of the delay element, outputting a result indicative thereof, and storing the result in the register, wherein the register value of a preceding cycle (k-1) is supplied to the delay element."

Applicants respectfully submit that Corleto does not teach or suggest "N micro-rotation blocks receiving a signal ( $i_0, q_0$ )" as recited in claim 7. In the Office Action, at the bottom of page 4, it is alleged that FIG. 14, elements 142 and 148, col. 6 lines 55-67, col. 7, lines 1-36, and col.9 lines 44-49 of Corleto disclose the cited feature. FIG. 14 of Corleto is a flowchart illustrating the operation of the automatic frequency control circuit 84 of FIG. 7<sup>1</sup>. The structure illustrated in FIG. 7 does not include the N micro-rotation blocks of the apparatus of claim 7 (See col. 6 lines 34-39 of Corleto stating "[the] automatic frequency control circuit 84 of FIG. 7 is comprised of the CORDIC vector rotation processor 88, a pilot filter 116, a CORDIC angle accumulation processor 118, a differentiator 120, a first multiplier 122, a limiter 124, a loop gain 126, a first integrator 119, a second integrator 121, and a second multiplier 128.") Elements 142 and 148 of FIG. 14 merely state "Perform CORDIC computing technique". Within col. 6 lines 55-67, col. 7, lines 1-36, the operations 142 and 148 are described as follows:

Next, in step 142, the CORDIC vector rotation processor 88 performs the CORDIC computing technique 81 to adjust the frequency of the digital baseband signal 86 using the reference signal 106, generating the frequency shifted signal 90.

<sup>1</sup> See col. 6 lines 46-48 of Corleto.

The CORDIC angle accumulation processor 118 computes the signal  $\theta_e(n)$  (step 148) by performing the CORDIC computing technique 81.

Based on the above-reproduced portions of Corleto, it appears that the Examiner considered the CORDIC vector rotation processor 88 and the CORDIC angle accumulation processor 118 to be micro-rotation blocks. However, the CORDIC angle accumulation processor 118 does not provide for any frequency correction and therefore it cannot be identified with a micro rotation block of the apparatus of a digital frequency correction recited in claim 7.

Corleto also fails to teach or suggest "a sign table providing to each micro-rotation block a sign ( $\sigma_n$ ) from a sign table." In the Office Action, tables 17 and 18 are indicated as disclosing this feature. However neither table 17 nor table 18 provide signs from a sign table to a micro-rotation block.

Further the Examiner concedes that Corleto does not disclose adding a predetermined frequency, but relies on Bruekers to compensate for this deficiency. The Office Action asserts that the samples  $s_0, s_1, s_2, \dots, s_5$  displayed in FIG. 14 of Bruekers have associated frequencies which are input to delay elements DCU1 and DCU2 whereby the signal  $F_{s1}$  is added to each of the sample values  $s_0, s_1, s_2, \dots, s_5$ . Applicants respectfully submit that this is a misunderstanding of the technique disclosed in Bruekers. The frequency  $F_{s1}$ , which is the sampling frequency used to clock the flip-flops F, is not added to any other frequency. As explained, for example, in column 7, lines 12-14, this input sampling frequency is a factor R higher than the output sampling frequency  $F_{s2}$  after down-sampling in the decimators 130, 140. Clock or sampling frequencies are control frequencies to clock the operation of delay and combination units DCU1 and DCU2, and are not added to any other frequency.

None of the other references cited in the outstanding Office Action (Collier, Volder and Welles) cure or correct the deficiencies of Corleto and Bruekers in teaching or suggesting:

- N micro-rotation blocks receiving a signal ( $i_0, q_0$ );
- a sign table providing to each micro-rotation block a sign ( $\sigma_n$ ) from a sign table; and
- an adder adding a predetermined frequency value to an output value of the delay element, outputting a result indicative thereof, and storing the result in the register, wherein the register value of a preceding cycle (k-1) is supplied to the delay element.

Additionally, Applicants respectfully submit that the Office Action does not meet the burden of showing the motivation of a person of ordinary skill in the art to combine the teachings of Corleto with the teachings of Bruekers. See *In re Lee*, 61 USPQ2d 1430, 1434 (Fed. Cir.

2002), requiring the PTO to "explain the reasons one of ordinary skill in the art would have been motivated to select the references ...." In the Office Action at the bottom of page 5, it is asserted obviousness and then paraphrased and cited col. 2, lines 49-55 of Bruekers. The indicated portion of Bruekers merely states the advantages of Bruekers' invention without any reference or connection to the system of Corleto. Applicants respectfully traverse the obviousness rejection based on Corleto and Bruekers because there is insufficient evidence for a motivation to modify Corleto's invention by incorporating Bruekers' teachings.<sup>2</sup>

## CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

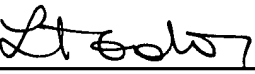
Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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<sup>2</sup> See MPEP 2143.01 stating "[o]bviousness can only be established by combining or modifying the teaching of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art," (citations omitted). See also MPEP 2144.08 III stating that "[e]xplicit findings on motivation or suggestion to select the claimed invention should also be articulated in order to support a 35 U.S.C. 103 ground of rejection. . . . Conclusory statements of similarity or motivation, without any articulated rational or evidentiary support, do not constitute sufficient factual findings."